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We claim:

1. A superconducting current limiting device comprising:
  - an interconnected high magnetic permeability structure including a central core interconnected to at least a first and second arm branching off there from;
  - 5 a superconductive coil surrounding the central core for biasing the central core;
  - a first alternating current coil surrounding said first arm and interconnected to an alternating current source;
  - a second alternating current coil surrounding a second arm and interconnected to an alternating current load;
- 10 said first and second alternating current coils being magnetically coupled to said central core wherein said device operates so as to limit the current passing through the device upon the occurrence of a fault condition in said load.
2. A device as claimed in claim 1 wherein each of said first and second arms substantially form a loop interconnecting a first and second end of said central core.
- 15 3. A device as claimed in claim 2 wherein each of said loops includes an air gap separating one portion of the loop from a second portion.
4. A device as claimed in claim 1 wherein said high magnetic permeability structure is formed from a ferrous material.
5. A device as claimed in claim 1 wherein the cross-sectional width of the high
- 20 magnetic permeability material forming the core is substantially twice the cross-sectional width of the high magnetic permeability material forming the arms.
6. A multiphase superconducting current limiter device including:
  - a central core formed from a high magnetic permeability material;
  - a superconductive coil surrounding the central core for biasing the central core;

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a first series of alternating current phase coils each interconnected to a phase of an alternating current source;

a second series of alternating current coils interconnected to a phase of at least one alternating current load;

5 said first and second series of alternating current coils being magnetically coupled to said central core wherein said device operates so as to limit the current passing through the device upon the occurrence of a fault condition in said source or load.

7. A multistage superconducting fault current limiter device comprising:  
at least a first and second superconducting fault current limiters, the first  
10 superconducting fault current limiter designed to current limit a first portion of a transient fault and the second superconducting fault current limiter being designed to current limit a second portion of a transient fault.

8. . A device as claimed in claim 7 wherein said first portion comprises an initial portion of said transient fault and said second portion comprises a steady state portion of  
15 said transient fault.

9. A superconducting current limiter substantially as hereinbefore described with reference to Fig. 2 of the accompanying drawings.

10. A multiphase superconducting current limiter substantially as hereinbefore described with reference to any of Fig. 3 to Fig. 5 of the accompanying drawings.

20 11. A multistage superconducting current limiter substantially as hereinbefore described with reference to Fig 6 of the accompanying drawings.

12. A multiphase superconducting current limiter device requiring only one cryostat, one cryocooler, and one superconducting coil

13. A DC saturated superconducting current limiter device including an air gap in the  
25 iron core

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14. A series of multi-phase DC saturated superconducting current limiter devices having iron cores, with at least one including an air gap in the iron core, and at least one having a continuous iron core.